Appl. No.   : 10/774,682   Atty. Docket No. 112020.129 US2 (NAN-6)
Amendment Dated : June 22, 2005
Reply to OfficeAction of : April 19, 2005

REMARKS

Claims 1, 2, 4-7, and 9-15 stand rejected under 35 U.S.C. §102(b) as being anticipated by Rueckes, et al., "Carbon Nanotube-Based Nonvolatile Random Access Memory for Molecular Computing," SCIENCE Magazine, July 7, 200, vol. 289, pp. 94-97 ("Rueckes"). Claims 3 and 8 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Rueckes in view of U.S. Patent No. 6,743,408 ("Lieber"). With this response, claims 1-6, 11, and 12 have been canceled, and claims 16-19 have been newly added. Claims 7-10, and 13-15 have been amended. No new matter is added by amendment. After this amendment, claims 7-10 and 13-19 are pending in the application.

We thank Examiner Coleman for the telephone interview of May 23, 2005. Specifically, and in accordance with 37 C.F.R. §133:

- Claim 1 was discussed relative to its rejection over Rueckes, et al.

- The Examiner stated that his main concern was regarding the language in claim 1 as filed that "the trace includes nanotube segments that contact other nanotube segments." Rueckes discloses a trace made of a single nanotube. However the Examiner stated the view that a nanotube is made up of "segments" which are in contact with each other (reading "segments" as synonymous with a word like "portions").

- We suggested amending the claim to instead recite "a plurality of nanotubes" to address the Examiner's concerns.

- The Examiner stated that this amendment would distinguish this feature of the claims over Rueckes. However, the Examiner expressed concern that other references teach "a plurality of nanotubes."

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- Thrust of argument presented: Other references teach *away* from the claimed invention because other references teach that a plurality of nanotubes is undesirable, and that single, separated nanotubes are preferred.

Rueckes discloses a memory storage device employing nanotube crossbar junctions. The specification refers to these as NTWCM (nanotube wire crossbar memory) devices, such as on page 5. The memory storage device consists of a crossbar array of memory cells, each cell having <u>one</u> suspended SWNT (single walled nanotube) crossing another SWNT. The Examiner is referred to Figs. 1A and 1B which he included in the Office Action of April 19, 2005, which show the crossbar array architecture. "At each cross point (m,n) in the array the suspended (upper) SWNT can exist in either the separated OFF state or the ON state in contact with the perpendicular nanotube on the substrate (lower) SWNT" (Rueckes p. 94). From this language as well as from the figure and captions, it is clear that each element in the crossbar array is an *individual* SWNT.

Further, each SWNT is individually addressable. Each individual SWNT is "contacted by a metal electrode" m or n as shown in Fig. 1B. The crossbar junction "can be switched between OFF and ON states by applying voltage pulses at electrodes n and m" (Rueckes pp. 94-95). This is possible because each SWNT provides an individual conductive pathway from one end of the nanotube to the other, e.g. is a trace. When the voltage pulses transmitted from m and n by the nanotube cross at point (m,n), that junction is switched. To summarize, Rueckes teaches a conductive pathway, or trace, made up of a single SWNT, which intersects another conductive pathway made of another single SWNT.

In contrast, claims 1, 11, and 12 as amended recite a conductive trace that includes "a plurality of unaligned nanotubes for providing a plurality of conductive pathways along the trace." Rueckes does not teach or suggest the use of a plurality of nanotubes to provide a plurality of conductive pathways along a trace. Rueckes teaches a *single* conductive pathway provided by a *single* nanotube. Rueckes teaches highly aligned arrays of single nanotubes.

Claim 6 as amended follows a similar argument, reciting a trace including "an electrical network of a plurality of unaligned nanotubes in contact with other nanotubes to provide a plurality of conductive pathways along the trace." Rueckes does not teach or suggest the use of an electrical network of plurality of unaligned nanotubes in contact with other nanotubes to provide a plurality of conductive pathways along a trace. Rueckes teaches a *single* conductive pathway provided by a *single* nanotube. Rueckes teaches that if a memory cell at (m,n) is switched ON, then one nanotube is in contact with another nanotube. However this situation places two individually addressed conductive traces in contact with each other, which is not the same as "a plurality of conductive pathways along the trace."

It should be noted that Rueckes teaches away from the use of "a plurality of unaligned nanotubes" "to provide a plurality of conductive pathways along the trace" as recited in amended independent claims 1, 6, 11, and 12. In contrast, Rueckes teaches articles *single*, separated, highly aligned nanotubes (see figs. 1 and 2). "It will ultimately be important to create devices in parallel using individual SWNTs" to create "highly integrated SWNT device arrays" (p. 97). Rueckes is silent on the use of a plurality of unaligned nanotubes.

Claims 13, 14, and 15 have been amended to recite "a wafer substrate structure having a non-woven fabric of unaligned nanotubes." The nanotubes taught by Rueckes are highly ordered and aligned, and thus do not anticipate the rejected claims as amended.

Because Rueckes teaches a conductive pathway made of single SWNTs instead of a plurality of unaligned nanotubes, the 103(a) rejection over Rueckes in view of Lieber is moot.

For the reasons stated above, we believe that the claims are allowable and therefore ask the Examiner to allow them to issue.

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No fees are believed to be due with this response. However, please charge any additional

fees or credit any overpayments to Deposit Account No. 08-0219.

Respectfully submitted,

For Applicants

Date:_____6/22/2005_____

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